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Vanishing Life of Australia.

THE conditions which made for the evolution of the fauna of Australia along its unique path, the isolation of the continent associated with the early influx of primitive groups of animals, are now hastening that peculiar fauna towards its doom. Uniqueness has its own attractions, and there can be no replenishment of the disappearing forms from the outside world. There can be no doubt on the question of the disappearance of Australian birds and mammals. Sir James Barrett expresses the general opinion in Australia when he says: "The answer is unequivocal. Except in certain places where enlightened citizens have protected them, they are all disappearing. It is difficult for anyone to show a visitor in the State of Victoria the larger marsupials or the lyre bird. It is quite impossible to find the smaller marsupials except in a few favoured places and with great trouble. It is, indeed, feared that some varieties have been exterminated."

The same opinion is held in America. The title of our article is that of a paragraph in the Annual Report for 1921 of the American Museum of Natural History, which goes on to say: "We are approaching the close of the age of mammals all over the world, but in no continent has the devastation been more rapid than that of Australia, owing to three causes: deforestation, an enormous fur trade, and an increasing leather trade. In 1921 it became apparent that the American Museum must secure its representative collection now or never. Accordingly an expedition headed by Curator William K. Gregory was sent to Australia . . . to explain the chief purposes of the Museum, which are to secure an exhibition of the wonderful and unique life of Australia, past and present, as distinguished from a research collection, which belongs properly in the Australian museums and in the great British Museum of Natural History in London."

It is a rule in the decline of a fauna that when agriculture and commercial slaughter have reduced numbers to rarity, new forces step in to complete the destruction. The rare animal becomes desirable, scientifically and commercially, and collectors, animated by one enthusiasm or the other, rush to secure the last of the specimens. In the British Isles with their limited fauna this tendency has been particularly forced upon the notice of naturalists. A few years ago, the once common kite, in spite of strenuous protection, was reduced to some five breeding pairs on the borders of

Wales; the great skua and the St. Kilda wren were brought to the verge of extinction, the osprey was exterminated, all through the activities of collectors.

In Australia the same forces have taken a hand in the threatening final stages. Sir James Barrett, in the work from which we have already quoted ("Save Australia", 1925, p. 3), says: "Australia has lately been inundated with collecting expeditions, and what is still more serious, private commercial collectors are trying to obtain specimens before extermination takes place"; and Dr. J. A. Leach writes (p. 122): "The rumour having gone forth that the Australian mammals, the most primitive in the world, are doomed to early extinction, the museums of the world are making special efforts to obtain specimens of Australian animals before it is too late. Many scientific expeditions have visited Australia in recent years. These must be controlled. Worse still, prices for Australian birds have soared so high that the greed of private traders has been excited, and some big shipments have been sent from Australia for private gain. The mortality has been heavy, and the cruelty involved great, but the high prices obtained for the remainder have yielded a handsome profit."

We had these facts and opinions in mind when in a note (July 11, p. 63) we referred to a new collecting expedition to Australia from the Harvard Museum of Comparative Zoology. Prof. T. Barbour, director of that museum, and himself a distinguished naturalist, takes exception to our comment, which he thinks may be interpreted as expressing jealousy of American scientific activity. We need scarcely assure him that our only jealousy is for the safety of the rare animals of Australia, and we welcome his assurance that no attempt is to be made to secure 'long series', although that was scarcely apparent from the American notice of the expedition, which stated that the collection aimed at being one of the largest and best balanced in the world. The instructions given to the members of the expedition in connexion with their collecting, as stated by Prof. Barbour, are unexceptionable, and we are certain that Harvard will make good scientific use of the specimens collected. Indeed, it becomes clear, when we examine the staff of this expedition and of the Agassiz Museum, from which it emanates, that this is no collecting expedition but one with more serious and desirable scientific aims.

Museums of zoology a century ago were collections of animals similar to and about as informative

as other indiscriminate collections. Then in Darwinian times an attempt was made to illustrate the main lines of evolution, and following this to obtain long series of animals to study the variation of the individual species, so as the better to understand this evolution. The mere student or sight-seer was relatively little catered for, and the bewildering variety of animals in the museum cases depressed him. To-day the adequate display of properly labelled and well selected animals illustrative of the phyla and their subdivisions is recognised as of peculiar necessity to students, since they have to learn much of this side of zoology, and also of the possible lines of evolution, without the aid of teaching that has to be thrown more and more in the direction of experimentation and the study of the forms of life in relation to their surroundings. It is this last side, which we may term the natural history of animals, that is likely to be increasingly occupying the attention of museums, for it interests the public also. To prepare the requisite displays, even of common animals, requires that each curator must know intimately his forms of life in the field, together with the vegetation and other animals associated with them. We understand that this is so well recognised at the Agassiz Museum that its staff is dispersed into the field during the summer months; the local province here is North America, including the West Indies. Occasional expeditions travel farther afield, following out the practice of Louis Agassiz, but no longer restricting themselves to marine life. The present expedition is under W. M. Wheeler, the distinguished American entomologist, whose studies on social and other insects have materially guided the development of modern research on insect life.

So far as we can see, it appears doubtful whether both the terms 'scientific' and 'collecting' can be applied to any expedition. The collecting expedition requires action and often a personnel not altogether desirable, while it tends to think too much of the value, as instanced by rarity, of the specimens obtained. The scientific expedition is necessarily led by experienced naturalists, whose study is the actions of the various forms of life in their natural habitats, and whose collections are supplementary to the understanding of these. These men personally dislike to kill, and no expedition led by them will ever gauge its success by the 'bag'. Such expeditions should be encouraged, whatever may be their origins, since their sole aim is to add to the common stock of knowledge.

This, however, leaves the question of the preservation of the fauna, which usually means the birds and mammals, of Australia and other regions unconsidered. It is surely useless to obstruct even 'collecting' expeditions, while the local fur and feather merchants and the professional collectors are left to pursue their aims. We suggest that nothing except local legislation, honestly and firmly applied, can really be effective in any country. The birds, mammals, and other animals can be classified by their rarity and by their effects, beneficial or otherwise, in relation to man. The introduction of animals from other countries would be considered as affecting both the local indigenous fauna and man's agriculture. In addition, national parks might be established, as has been done in Africa and other countries, and there are surely large tracts of Australia and Tasmania which might be so declared without seriously affecting the local population. Sporting, collecting, and scientific expeditions would be either licensed or prohibited as might seem desirable. There would be no hardship in this, for science has nothing to fear when it is understood that the progress of the State is inseparably locked with its own.

Geophysical Prospecting.

The Principles and Practice of Geophysical Prospecting: being the Report of the Imperial Geophysical Experimental Survey. Edited by A. B. Broughton Edge and Prof. T. H. Laby. Pp. xiii + 372. (Cambridge: At the University Press, 1931.) 15s. net.

TO the Imperial Geophysical Experimental Survey, 1927-29, was entrusted the task of testing, under conditions and on problems available in Australia, the applicability of the principal methods—gravitational, magnetic, seismic, and electrical—which recent developments in apparatus for local geophysical investigations have placed at the disposal of the economic geologist. As explained by the Director in his introduction to this Report, special stress was placed on the electrical methods, in view of the paucity of reliable information regarding these methods which was available at the time when the Survey was initiated.

The volume, however, comprises a good deal more than a mere detailed account of the tests undertaken in Australia, valuable though these are. As the title hints, it is, in addition, a comprehensive review of the principles of applied geophysics, and as such immediately stands out

as the best available English exposition of these principles. Moreover, in the wealth of detail and illustration used to describe the apparatus employed, and the invaluable accounts of the procedure used in the field and in interpreting the results, the book fulfils all the functions of a practical manual of the science. Finally, in the comprehensively illustrated reports of the actual surveys undertaken, with the careful analysis and conclusions added both individually and as a whole, the volume permits all interested in the economic application of geophysics to form conclusions regarding its value on problems differing widely in characteristics. Of very particular interest in this connexion is the frequency with which, so far as possible, several methods have been tested on the same problem, in order that a comprehensive estimate of costs and value might be made.

The work is ingeniously divided into two parts. The first part, occupying some two-thirds of the book, may be regarded as the report proper; the second part comprises a very detailed exposition of the theory of each method and the apparatus employed. Thus the first part is more suited to the mining engineer and geologist who wish to assess the value of the method and its characteristic scope, whilst the second part is more adapted to the critical analysis of the physicist. In each chapter of Part 1, a brief introduction to the method is imparted, but much greater detail of the physical principles involved will be found in Part 2.

In Chapter xi will be found the general conclusions as to the applicability of the methods in Australia, and hints and statistics to serve as a basis for judgment as to their value elsewhere, but certain conclusions are also drawn in the various chapters of Part 1. Each section of the volume, whether principles, apparatus, procedure, or actual surveys, aims at a high standard, and attains it within the necessary limitations of the book. It is doubtful whether the whole range of the principles and procedure of geophysical prospecting could be comprehensively surveyed in a single volume of reasonable dimensions. So much of both pure and applied physics is involved in each individual method that a good-sized book could readily be filled in each case, as indeed has been demonstrated by the German publication "Samm- lung geophysikalischer Schriften".

In the present volume, the tendency has been to build the 'procedure' round the actual 'practice' in Australia, so that in certain respects the account